Applicants note that the subject matter of claim 1 has been split between claim 1, which is directed to a smooth aluminum oxide layer, and claim 21, which is directed to an aluminum layer. The subject matter of claim 15 has been split between claim 15, which is directed to a smooth aluminum oxide layer, and claim 22, which is directed to an aluminum layer.

Applicants note that claim 20 incorporates generally the subject matter of claims 1 and 21, but recites a limitation wherein the substrate is comprised of plastic. The claim is supported in the specification at page 3, lines 5-7.

Claims 23-27 generally incorporate the subject matter of claims 2-4 and 9-10, respectively, but are dependent on claim 21.

The subject matter of claim 11 has been split between claim 11 and claim 28. The subject matter of claim 16 has been split between claim 16 and claim 29.

Applicants gratefully acknowledges the establishment of a CPA in this application.

Applicant notes, before discussion of the specific rejections, that none of the references disclose the use of an aluminum layer or of a smooth Al_2O_3 layer as a homeotropic alignment layer. To account for this lack of disclosure, the Examiner states in almost every rejection that "It would have been obvious to use Al_2O_3 as the orientation layer material since this material is commonly used as the aluminum oxide material in liquid crystal display devices." First, Applicant respectfully submits that this statement does not address new claims 21-22, which are directed to an aluminum layer. In addition, even if, arguendo, aluminum oxide has uses in liquid crystal devices, this does not negate the inventive activity of using them as claimed herein.

Claim Rejection 35 U.S.C. §103

Claims and 1 and 11-19 have been rejected under 35 U.S.C. §102(b) as anticipated by or, in the alternative, under 35 U.S.C. §103(a) as obvious over Krueger et al. (Krueger) 4,112,157. Applicants filed a CPA in response to the first Office Action which cited Krueger '157. Such a filing does not require remarks on the outstanding issues. Therefore, Applicants have not acquiesced in regard to the position taken by the Examiner regarding the reference Krueger. Applicants respectfully submit that the subject matter of the invention is not anticipated by, or obvious in view of, this reference.

The subject matter of the invention herein is directed to a liquid crystal film or layer with homeotropic alignment in which the homeotropic alignment is achieved by the presence of an aligning layer of aluminum as in claims 21-22 or smooth Al_2O_3 on a substrate as in claims 1 and 15, respectively.

The use of a aluminum or aluminum oxide layer as the aligning layer results in the alignment of orthogonal liquid crystal phases, particularly nematic and smectic, on polymer substrates. As discussed in the specification at page 3, lines 24-29, polymer substrates coated with typical aligning materials such at TiO_2, SiO_2 and similar compounds do not align well, in part because these compounds have a significant surface roughness which prevents the polymer film from being released from the aligning layer after polymerization. As discussed in the specification on page 18, lines 17-35, the surface roughness inherent to inorganic aligning agents is problematic because it helps prevent a film from being easily released from a surface after UV curing of the reactive liquid crystal. As shown in the examples, PET substrates which have been coated with (aluminum) smooth aluminum oxide provide films with good homeotropic alignment, and which are released with a pressure sensitive adhesive on TAC. Such a removal procedure is not shown or discussed in the cited references.

Krueger, by contrast, is directed a liquid crystal cell comprising a layer of liquid crystal material between a pair of carrier plates, and the use of vapor-deposited films of organic salts as orientation layers for liquid crystal displays. Krueger teaches the use of Al_2O_3 to achieve homeotropic or tilted homeotropic alignment, but Krueger fails to disclose the use of an aluminum alignment layer as in claims 21-22, and fails to disclose the use of a <u>smooth</u> alignment layer of aluminum oxide as in claims 1 and 15 herein. Accordingly, Krueger does not disclose each of the limitations of the claim as required for a rejection under Section 102. Further, Krueger is concerned with a different problem than that of the invention herein and, accordingly, provides no disclosure or teaching concerning the removability of a cured film from a substrate. Accordingly, Krueger does not disclose or teach the use of a smoothed Al_2O_3 film or aluminum coating to address the problem herein.

Accordingly, it is respectfully requested that this rejection be withdrawn.

Claims 1 and 9-19 have been rejected under 35 U.S.C. §102(e) as anticipated by or, in the alternative, under 35 U.S.C. §103(a) as obvious over Scherer et al. (Scherer) 5,880,801.

It is respectfully submitted that the claims are not anticipated or obvious in view of Scherer. Scherer discloses a method of homeotropic alignment wherein anodized aluminum is used as an orientation layer and covered with an aluminum oxide layer (col. 2, lines 44-53) as part of the manufacture of semiconductor and optical devices. The surface topography of this arrangement is far from smooth, and has deep channels of aluminum oxide, as illustrated in Figure 2 of Scherer. Scherer teaches the advantages of using a porous aluminum layer, stating that a HAN liquid crystal cell made using the porous aluminum "has strong homeotropic alignment near the bottom substrate induced by the porous aluminum oxide." (col. 3, lines 24-26) Scherer not only does not disclose or teach the use of the smooth layer as herein, Scherer, by teaching the advantages for the purpose therein of the use of a porous layer, teaches away from the use of a smooth layer.

Accordingly, it is respectfully requested that this rejection be withdrawn.

Claims 1, 3, 9 and 10 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Kato et al. (Kato) 5,745,205. Applicant respectfully submits that the claims herein are not obvious in view of Kato.

Kato is directed to a method of introducing slightly tilting homeotropic into a liquid crystal layer by using an inorganic orientation layer comprising SiO_2 or TiO_2 layers, or similar materials.

Kato does not disclose, or provide a teaching or motivation for either the use of an Aluminum or an Al_2O_3, layer, let alone a smooth Al_2O_3 layer. As discussed herein and in the specification at page 3, lines 19-31, the use of layers of SiO_2, TiO_2 or similar materials does not address the issue of layer separation, let alone separation from a plastic substrate, as does the invention herein.

Accordingly, it is respectfully requested that this rejection be withdrawn.

Claims 1, 3, 9 and 10 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Ma (Ma) 5,056,898. It is respectfully submitted that the claims herein are not obvious in view of Ma.

Ma is directed to PDLC films. Ma uses silanes as surface active compounds (col. 8, lines 53-55) and surface active agents are explicitly mentioned in regard to orientation of liquid crystals on glass or conducting metal oxides (col. 8, lines 34-39). Applicant notes that the specification on page 2, lines 16-34 describes the state of the art and explicitly mentions silanes at page 2, lines 19 and 31 as an aligning agent for glass substrates.

Ma does not disclose, or provide a motivation for an aligning layer of aluminum as in claim 21 or aluminum oxide as in claim 1. As is clear from the disclosure, Silane is a distinct and different material than Aluminum or Aluminum Oxide.

In addition, Ma does not provide a motivation for providing a layer capable of functioning on a plastic substrate as in claim 20, (See specification at page 3, lines 6-16).

Accordingly, it is respectfully requested that this rejection be withdrawn.

Claims 2 and 4 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Kato or Ma as applied to claims 1, 3, 9 and 10 above and in view of Ohnishi et al. (Ohnishi) 5,601,884. Applicant respectfully submits that the subject matter of the claims is not obvious over these references.

Ohnishi is directed to retardation films having substrates of polymeric material. Ohnishi, like Kato and Ma, does not disclose or teach the use of a smooth aluminum or aluminum oxide aligning layer. In addition, the alignment of the liquid crystal in Ohnishi is parallel to the surface (Abstract, lines 5-6 and col. 22, lines 29-30, i.e. is homogeneous, whereas the invention herein relates to homeotropic alignment of liquid crystals. Accordingly, one of ordinary skill would not be motivated to combine the teachings of Ohnishi with Ma or Kato because the respective liquid crystal layers have differing and incompatible alignments.

Even if, arguendo, all the elements were somehow present, no motivation has been provided to combine the orientation materials of either Kato, Ma with Ohnishi in such a way as

to result in the product herein. Even if the references could be modified to incorporate all the limitations of independent claim 1, the mere fact that the prior art could be modified to arrive at the claimed invention is insufficient. The prior art must suggest to one of ordinary skill in the art the desirability of the necessary modification. See In re Laskowski, 10 U.S.P.Q.2d 1397 (Fed. Cir. 1989); and; In re Geiger, 2 U.S.P.Q.2d 1276 (Fed. Cir. 1987). The fact that aluminum oxide coatings are present in the art does not negate the inventive activity of providing a smooth aligning layer of aluminum or Al_2O_3 on the substrate to facilitate separation "Obvious to try" is not a valid test of patentability. *In re Dow Chemical Co.* 837 F.2d 469, 5 USPQ2d 1529 (CAFC 1988), cited with approval in *In re Sligo Research* 36 USPQ2d 1380 (CAFC 1995 Unpub. Dec.). There must be a suggestion or teaching to use an aluminum or smooth Al_2O_3 as a homeotropic alignment layer. *In re Cofer*, 148 USPQ 268 (CCPA 1966); *See also Bristol Myers Co. v. U.S. ITC*, 15 USPQ 1258 (CAFC 1989). The suggestion is not present here. The use of a smooth aligning metal aligning layer offers advantages in the manufacture of liquid crystals which are neither contemplated nor sought after in the references.

Accordingly, it is respectfully requested that this rejection be withdrawn.

In view of the foregoing, it is respectfully submitted that this application is in condition for immediate allowance. If there are any matters which may be expedited by a telephone call, the Examiner is cordially invited to contact counsel for applicants at the number indicated below.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

Please amend claims 1 and 15 as follows:

1. (Twice Amended) Liquid Crystal film or layer with homeotropic alignment ~~characterized in that,~~

wherein said homeotropic alignment is achieved by an aligning layer on a substrate, and ~~that~~ wherein said aligning layer is ~~an aluminum coating or~~ a smooth Al_2O_3 layer.

11. A liquid crystal layer as in claim 1, wherein said aligning layer is ~~an aluminum coating of medium optical density, an aluminum coating of high optical density or~~ a thin transparent Al_2O_3 coating.

12. A liquid crystal layer as in claim ~~11~~ 28, wherein said aligning layer is an aluminum coating with an optical density of from 1.0 to 2.0.

13. A liquid crystal layer as in claim ~~11~~ 28, wherein said aligning layer is an aluminum coating with an optical density of more than 2.0.

15. (Amended) An aligning layer for a liquid crystal film or layer which provides homeotropic alignment, said aligning layer comprising ~~an aluminum coating or~~ a smooth Al_2O_3 layer.

16. An aligning layer as in claim 15 which comprises ~~an aluminum coating of medium optical density, an aluminum coating of high optical density or~~ a thin transparent Al_2O_3 coating.

17. An aligning layer as in claim ~~16~~ 29, which comprises an aluminum layer with an optical density of from 1.0 to 2.0.

18. An aligning layer as in claim ~~16~~ 29, which comprises an aluminum coating with an optical density of more than 2.0.